Remarks

Claims 46 and 48 through 52, 55, 57, and 61 through 62 are currently pending. Claims 1 through 45, 47, 53, and 54 have previously been cancelled; Claims 56, 58 through 60, and 63 have been cancelled by this amendment, Claims 58 through 60 and 63 having previously been withdrawn. Claim 46 has been amended to clarify that the recited filter structure is a depth filter.

Applicant's wish to extend their appreciation to the Examiner for indicating that the rejection of the claims as unpatentable over the Caliskaner paper, which describes Applicant's own invention, has been overcome (*Evaluation of the Fuzzy Filter for the Filtration of Secondary Effluent* by Onder Caliskaner and George Tchobanoglous, dated September 1996 and published by the Department of Civil and Environmental Engineering at the University of California in Davis).

All of pending Claims 46 and 48 through 52, 55, 57, and 61 through 62 have been rejected as unpatentable based on Masuada et al. U.S. Patent No. 5,248,415 and Wen et al. 4,157,959 considered in combination. These references have previouly been made of record, considered by the Examiner, and applied to reject the claims in previous office actions to which Applicant has responded, most recently in its preliminary amendment filed September 1, 2006.

The evidence of record establishes that the invention as claimed by the Applicant is more than the sum of the Masuda and Wen elements. The Caliskaner paper shows the Applicant's invention to be a "new innovative filtration technology" at page 2-4, with unexpected and unpredictable results of low backwash water requirements that could potentially be reduced to as low as one percent (page 5-9) and a uniform rate of particle removal (Figures A-1(b) to A-16(b)). Neither Masuda or Wen or any of the other references of record, considered alone or in combination, disclose or suggest these unexpected and unpredictable results. The evidence provided in the Declaration of William F. Forman, III, filed September 1, 2006, and in the Declaration of George Tchobanoglus, Ph. D., dated December 20, 2003, support explicit findings that the person of ordinary skill in the art would not have understood or reasonably expected the claimed structure to provide either low backwash water requirements or a uniform rate of particle removal over a filtration cycle.

The Examiner recognizes that the Wen reference does not explicitly disclose a porosity gradient across a fixed filter bed of compressible media that progresses from more porous to less porous in the axial flow direction, as is recited in all of Applicant's claims. The Wen reference describes a filter bed of granular filtration media that is not compressible and, as demonstrated below by the evidence of record, cannot inherently disclose or suggest a porosity gradient as recited in the pending claims. The Wen non-compressible bed is convertible from a fixed bed to a fluidized bed and can operate with one portion fixed and another fluidized and with the proportion of fluidized to fixed bed selectively varied. As shown in Figure 3 of the Wen reference, the packed bed is atop the fluidized bed and a trapped cake of solids is formed at the interface of the fixed and fluidized portions. The bed changes at the interface from a fluidized bed to a packed bed. No porosity gradient is formed progressing from more porous to less porous for the progressive removal of smaller and smaller particle sizes whatsoever, but a progressively moving interface at which solids are trapped.

It should be recognized, based on the evidence of record, that the Wen reference discloses a filter fundamentally different in kind from that of the Applicant's claims and from which the performance of Applicant's filter cannot be predicted. As set forth in paragraph 28 of the Declaration of William F. Foreman, III, filed September 1, 2006:

> *28. The apparatus of the invention is also fundamentally different from the subject matter disclosed in Wen et al. U.S. Patent No. 4,157,959. The Wen patent describes a granular filtration medium in a fixed bed held between a lower distributor plate and an upper sieve plate that is movable to create a fixed or fluidized bed of granular media. As set forth in the Exhibit A to the Tchobanogous declaration, waste water flows around particles of granular media, which is fundamentally different from the concept of a compressible media depth filter, in which waste water flows through the media. So even though Wen describes a granular depth filter, none of the filter models for granular filtration can be used to predict the performance of compressible media in the structure of*

> *the Fuzzy Filter depth filter, as pointed out in Exhibit A to the Tchobanogous declaration, and to which Schreiber's '349 application is directed.*

The Fuzzy Filter referred to imediately above is the trademark for Applicant's invention. Exhibit A of the Tchobanoglous declaration of December 20, 2003, also referred to immediately above, is the Caliskaner paper previously considered and made of record. Dr. Tchobanoglous's and Mr. Foreman's qualifications to speak to the matters addressed are set forth in their declarations.

The Caliskaner paper describes the Applicant's own invention as set forth in the Declaration of William F. Foreman, III, filed August 3, 2007, and thoroughly sets forth the unexpected results and unpredictable performance of Applicant's invention in comparison to filters of the kind described by Wen and Masuda in achieving low backwash water requirments and a uniform rate of particle removal over a filtration cycle (see Figures A-1(b) through A-16(b) of the Caliskaner paper and these same Figures 8(b) through 23(b) of Applicant's patent application U.S. Serial Number 10/661,349).

The evidence of record establishes in paragraphs 12 through 13 of the September 1, 2006 Foreman declaration that the structure of the Masuda reference is a surface filter and does not disclose or suggest the structure of a depth filter of compressible media as set forth in Applicant's claims:

> *12. The apparatus described in the Masuda patent is a different kind of filter operating on different principles from the apparatus described in the captioned Schreiber patent application, even though each filter uses the same media, compresses the media, filters in an up-flow mode, and is cleaned up-flow in an expanded condition. The Masuda apparatus operates as a surface filter and clogs rapidly at the surface without loading the filter media throughout the bed, whereas the Schreiber filter is a depth filter less subject to clogging that removes suspended particles of varying sizes at a uniform rate throughout its depth. In*

Schreiber's experience, the Masuda patent describes an inferior design that requires cleaning too often and requires a full flow rate volume of waste water for washing the media.

13. On the other hand, and as demonstrated in the Tchobanoglous declaration and attachments thereto, the Schreiber filter not only removes particles throughout its depth, but can be cleaned with a low volume of waste water flowing in the same direction as the water to be filtered.

The Tchobanoglous declaration establishes in detail at paragraphs 14 through 22 the significance of the differences between the surface filter of the Masuda reference and Applicant's depth filter:

14. In the Masuda apparatus, the dense and uniform filter layer that results from compressing the fibrous lumps from the bottom up is counter-productive to the filtration process and in practice causes rapid clogging of the filter bed to occur. By compressing the fibrous lumps from the bottom, where the fluid enters the filter, the filter described in the Masuda et al. patent acts similar to a surface filter (e.g., a septum). In sharp contrast, the apparatus of the invention is a depth filter that removes suspended particles of varying sizes at a uniform rate throughout its depth. The filter of the invention is much less subject to clogging.

15. As material to be filtered passes through the filter bed during the filtration process of the invention, the size distribution of the particulate matter remaining at any point within the filter is reduced. Particles with a decreasing size distribution are effectively removed in the practice of the invention because the average pore size of the compressible filter material also decreases. Pore size distribution decreases from large at the inlet to small at the outlet.

16. Decreasing pore size distribution is in sharp contrast to the Masuda patent, in which pore size does not decrease and larger particles and fines are trapped at the surface of the filter bed. Decreasing the pore size distribution in the direction of fluid flow, which is to say increasing the pore size distribution throughout the filter bed in a direction opposite to that of the fluid flow, maintains removal of particles in dependence on particle size and bed depth, removing smaller and smaller particles with increasing bed density, precluding small particles from clogging the surface of the filter.

17. In further contrast to Masuda, with a moveable compression plate as described in the pending patent application, the pore size of the filter material can be changed during the filtration process in response to filtration performance. Thus, a substantially uniform rate of particle removal can be maintained over the filtration cycle of the filter, as illustrated in Figures B of Figures 8 through 23 of the application. A uniform rate of particle removal over the filtration cycle and adjustable variation in pore size from larger to smaller in the direction of fluid flow over the course of filtration are not achievable in the apparatus of the Masuda patent.

18. The filter of the invention eliminates the structure described in the Masuda patent for moving the lower movable plate, thereby eliminating the ram for the plate that reduces volume in the filter bed, potentially tangles media, channels fluid flow, and can cause sealing problems where the ram passes through the upper stationary perforated plate.

19. That a pore size distribution exists in the filter bed of the invention, which pore size distribution varies from large at the inlet to the filter bed to small at the outlet, was demonstrated in the Ph.D. thesis completed and on file at the University of California at Davis (Caliskaner, 1998) (Exhibit A) and more

recently in a report titled Evaluation of the Filtration Bed Compression Gradient of the Fuzzy Filter; A Compressible Media Filter (The Resource Consulting Group, 2002) which is attached to this declaration as Exhibit B. As illustrated in the attached reports, the media pore size distribution will vary significantly at the compression ratios normally used for filtration.

20. If the pore size distribution does not decrease in the direction of fluid flow through the filtration media, whether the filter bed is uniformly compressed or is compressed in the wrong direction, as in Masuda, then the rate of suspended particle removal throughout the filter bed will not be uniform and larger particles and fines will tend to accumulate on the surface of the filter, promoting rapid clogging of the filter.

21. Even if it is accepted as true that the porosity is adjustable of the filter disclosed in the Masuda reference, albeit in the wrong direction, it is not true that Masuda discloses all but the direction of porosity adjustment in the pending application. The Masuda reference fails to recognize the establishment of a pore size distribution in the bed and discloses a bed of uniform density. The Masuda filter is incapable in its design of realizing the benefits of adjustable porosity and of varying the pore size throughout the filter depth because the water to be filtered initially encounters the smallest pore size and both large particles and fines are removed at the surface of the filter, clogging the filter.

22. The Masuda reference not only fails to recognize the direction of porosity and the establishment of a pore size distribution from large to small in the direction of fluid flow, but the benefits of eliminating apparatus that interfere with filtration efficiency, including a ram that extends through the filter bed and is sealed against the stationary plate at the top of the Masuda bed.

Based on the evidence of record, there is no disclosure or suggestion in either the Masuda or Wen references of any of Applicant's claims, which all recite a fixed bed of compressible filter media having a porosity gradient proceeding progressively from more porous to less porous in the axial flow direction. Masuda discloses at Column 2 lines 13 through 15; Column 4, lines 10 through 13 and 43 through 46; and Column 5, lines 49 through 53 that compression forms a dense and uniform filter layer, and never discloses, either explicitly or inherently, or suggests in any manner whatsoever, a structure in which the collector size, effective pore size, and depth of the filter are adjustable. Masuda discloses a uniform filter layer, not a uniform rate of particle removal over a flitration cycle (Tchobanoglous declaration, paragraph 17, quoted above).

Even if these references are considered in combination, the combination does not suggest a fixed bed of compressible filter media having a porosity gradient proceeding progressively from more porous to less porous in the axial flow direction. The Wen and Masuda references are directed to different problems, and the problems to which these references are directed differ significantly from that to which are directed Applicant's claims. Wen provides a depth filter of non-compressible media that is operated as a convertible bed, with one portion fluidized to establish an interface that traps a filter cake between the fluidized and fixed portions. Masuda provides a compressible media for filtering waste water in a structure that creates a surface filter. Even in combination, these elements of Masuda and Wen do not provide the structure of a fixed bed of compressible filter media having a porosity gradient proceeding progressively from more porous to less porous in the axial flow direction, much less the surprising, unexpected,and unpredictable results of a low backwash water flow rate and a uniform rate of particle removal throughout a filtration cycle.

In view of the evidence of record, it is respectfully submitted that all of Claims 46 and 48 through 52, 55, 57, and 61 through 62 are patentable over the references of record, whether considered alone or in combination, and an early indication of the allowability of these claims is earnestly solicited.

The Applicant is unaware of any fees due for this Response and Amendment. If the Examiner determines, however, that additional fees are required or if any credits are due, the Examiner is hereby authorized to charge or credit Deposit Account No. 50–0332 as appropriate.

Respectfully submitted,

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